

Amendment and Response Under 37 C.F.R. §1.116 - Expedited Examining Procedure

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Serial No.: 09/651,702

Confirmation No.: 2471

Filed: August 30, 2000

For: SUPERCRITICAL COMPOSITIONS FOR REMOVAL OF ORGANIC MATERIAL AND METHODS
OF USING SAME

Remarks

The final Office Action mailed September 18, 2002, and the Advisory Action mailed January 9, 2003 have been received and reviewed. Claims 19, 25, 27, and 29 having been amended, the pending claims are claims 19-25, 27-29, 31-32, and 43-48. Reconsideration and withdrawal of the rejections are respectfully requested.

Independent claims 19, 25, and 27 have been amended to recite that the composition is an organic material removal composition, which is supported, for example, by originally filed claims 19, 25, and 27. The amendment to claim 29 is supported, for example, by originally filed claims 27 and 29.

Examiner's Interview

Applicant's Representatives thank the Examiner for the telephonic interviews granted to Applicant's Representatives, Ann M. Mueeting and Loren D. Albin, on February 4 and February 11, 2003. The rejection of claim 29 under 35 U.S.C. §112, first paragraph, was discussed, and proposed claim language for an amendment to claim 29 was also discussed and agreed upon. Further, the patentability of claims 19-25, 27-29, 31-32, and 43-48 under 35 U.S.C. §103(a) was discussed. Applicant's Representatives thank the Examiner for agreeing to reconsider Applicant's arguments of record for the patentability of claims 19-25, 27-29, 31-32, and 43-48 under 35 U.S.C. §103(a), which are also presented herein below.

Rejection under 35 U.S.C. §112, First Paragraph

The Examiner rejected claim 29 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant respectfully traverses the rejection for reasons similar to those presented in the Response mailed December 18, 2002. However, in the interest of expediting the prosecution of the present application, claim 29 has been amended, and the rejection is obviated.

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Reconsideration and withdrawal of the rejection under 35 U.S.C. §112, first paragraph, is respectfully requested.

Rejection under 35 U.S.C. §103

The Examiner rejected claims 19-25, 27-29, 31-32, and 43-48 under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Pat. No. 5,013,366 (Jackson et al.) in view of U.S. Pat. No. 5,037,506 (Gupta et al.). Specifically, the Examiner alleged that the combination of Jackson et al. in view of Gupta et al. teaches a composition including sulfur trioxide in the supercritical state. Applicant respectfully traverses the rejection.

"To establish a *prima facie* case of obviousness . . . there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." M.P.E.P. §706.02(j). Furthermore, "[t]he teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure." M.P.E.P. §706.02(j). Applicant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness.

Jackson et al. teach the use of a dense phase gas to remove contaminants from a substrate. Although carbon dioxide is the preferred dense phase gas, typical gases may also include hydrocarbons, halogenated hydrocarbons, or inorganics such as nitrous oxide. The dense phase gas mixture may also include additives such as hydrogen peroxide, ozone, and halogens including fluorine gas. The dense phase gas is pressurized above the critical pressure, and then temperature is cycled above and below the critical temperature to effect removal of contaminants from the substrate.

As the Examiner pointed out, Jackson et al. do not teach the use of a supercritical fluid containing the oxidizing agent SO₃ to remove contaminants from a substrate. The Examiner then improperly combined the teaching of Gupta et al. with the teaching of Jackson et al. to support the above rejection. It is respectfully submitted that this is improper because

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Gupta et al. fail to teach or suggest the use of *any* supercritical fluid to remove contaminants from a substrate.

Gupta et al. disclose a method of removing organic materials, such as implant and deep UV hardened photoresist, from a substrate by using sulfur trioxide. Gupta et al. generate SO₃ vapor from commercially available stabilized or unstabilized, liquid or solid, sulfur trioxide. The SO₃ vapor is then used to remove the organic material from the substrate. Gupta et al. do not teach or suggest the use of SO₃ in a composition containing a supercritical component to remove organic material from a substrate. Significantly, Gupta et al. do not teach the use of supercritical SO₃ to remove organic material from a substrate. While SO₃ has a critical temperature of 218.3°C and a critical pressure of 83.8 atmospheres (e.g., page 16, lines 10-12 of the present specification), Gupta et al. teach the use of a maximum temperature of only up to 150°C (column 4, line 46-47), and apparently under atmospheric pressure conditions. Gupta et al. make no mention of conducting the removal process under pressurized conditions. The conditions recited by Gupta et al. are clearly inadequate to produce a supercritical fluid.

Furthermore, neither Jackson et al. nor Gupta et al. teach or suggest that SO₃ would be compatible in the preferred mixtures described herein (e.g., claims 20-21, 23-25, 27-29, 31-32, and 43-48), particularly under supercritical conditions.

Based on the remarks presented herein, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection under 35 U.S.C. §103.

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It is respectfully submitted that all the pending claims are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicant's Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted for

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February 11, 2003

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CERTIFICATE UNDER 37 CFR §1.8:

The undersigned hereby certifies that this paper is being transmitted by facsimile in accordance with 37 CFR §1.6(d) to the Patent and Trademark Office, addressed to Assistant Commissioner for Patents, Attn: Box AF, Washington, D.C. 20231, on this 11th day of February, 2003, at 3:20 pm (Central Time).

By:

Name: Jill R. Price

**APPENDIX A - SPECIFICATION/CLAIM AMENDMENTS
INCLUDING NOTATIONS TO INDICATE CHANGES MADE**

Serial No.: 09/651,702

Docket No.: 150.00800102

Amendments to the following are indicated by underlining what has been added and bracketing what has been deleted. Additionally, all amendments have been indicated by the use of bold font.

In the Claims

For convenience, all pending claims are shown below.

19. (Amended) A[An organic material removal] composition comprising sulfur trioxide (SO₃) in a supercritical state, wherein the composition is an organic material removal composition.

20. The composition of claim 19, wherein the composition further comprises at least one oxidizer selected from the group consisting of sulfur dioxide (SO₂), nitrous oxide (N₂O), NO, NO₂, ozone (O₃), hydrogen peroxide (H₂O₂), F₂, Cl₂, Br₂, and oxygen (O₂).

21. The composition of claim 20, wherein the at least one oxidizer is in a supercritical state.

22. The composition of claim 19, wherein the composition consists essentially of sulfur trioxide in the supercritical state.

23. The composition of claim 19, wherein the composition further comprises an additional component selected from the group consisting of carbon dioxide (CO₂), ammonia (NH₃), H₂O, nitrous oxide (N₂O), carbon monoxide (CO), nitrogen (N₂), helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).

24. The composition of claim 23, wherein the additional component is carbon dioxide.

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- 9 ~~26~~. (Amended) ~~A~~[An organic material removal] composition comprising sulfur trioxide (SO₃) in a supercritical state and an oxidizer, wherein the composition is an organic material removal composition.
- 11 ~~27~~. (Amended) ~~A~~[An organic material removal] composition comprising:
a first component selected from the group consisting of carbon dioxide (CO₂), ammonia (NH₃), H₂O, nitrous oxide (N₂O), carbon monoxide (CO), nitrogen (N₂), helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe);
a second component selected from the group consisting of sulfur dioxide (SO₂), nitrous oxide (N₂O), NO, NO₂, ozone (O₃), hydrogen peroxide (H₂O₂), F₂, Cl₂, Br₂, and oxygen (O₂); and
sulfur trioxide (SO₃) in a supercritical state, wherein the composition is an organic material removal composition.
- 12 ~~28~~. The composition of claim ~~27~~¹¹, wherein the first component is carbon dioxide.
- 13 ~~29~~. (Amended) The composition of claim ~~27~~¹¹, wherein a ratio of the [sulfur trioxide]first component to the total of the second component plus sulfur trioxide is about 1:100 by volume to about 100:1 by volume.
- 14 ~~31~~. The composition of claim ~~28~~¹², wherein a ratio of carbon dioxide:sulfur trioxide is about 10:1 by volume to about 1:1 by volume.
- 15 ~~32~~. The composition of claim ~~27~~¹¹, wherein the first component is in a supercritical state.
- 16 ~~33~~. The composition of claim ~~27~~¹¹, wherein the second component is in a supercritical state.

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- 17 44. The composition of claim ~~27~~¹¹, wherein the first component and the second component are both in supercritical states.
- 7 45. The composition of claim ~~27~~⁵, wherein the additional component is in a supercritical state.
- 8 46. The composition of claim ~~19~~¹ further comprising a component selected from the group consisting of hydrogen chloride, hydrogen bromide, hydrogen fluoride, ammonium fluoride, tetramethylammonium fluoride, tetramethylammonium hydroxide, beta-diketones, fluorinated-diketones, organic acids, and combinations thereof.
- 10 47. The composition of claim ~~25~~⁹ further comprising a component selected from the group consisting of hydrogen chloride, hydrogen bromide, hydrogen fluoride, ammonium fluoride, tetramethylammonium fluoride, tetramethylammonium hydroxide, beta-diketones, fluorinated-diketones, organic acids, and combinations thereof.
- 18 48. The composition of claim ~~27~~¹¹ further comprising a component selected from the group consisting of hydrogen chloride, hydrogen bromide, hydrogen fluoride, ammonium fluoride, tetramethylammonium fluoride, tetramethylammonium hydroxide, beta-diketones, fluorinated-diketones, organic acids, and combinations thereof.